



# Satellite Derived Vertical Moisture Database Users Handbook

By  
Thomas Elio  
Patrick Giese



**MARCH 1996**

APPROVED FOR PUBLIC RELEASE;  
DISTRIBUTION IS UNLIMITED.

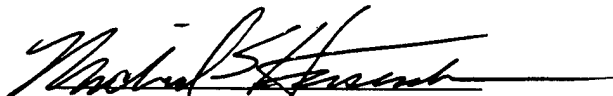
19960508 086

Air Force Combat Climatology Center  
859 Buchanan Street  
Scott Air Force Base, Illinois 62225-5116

19960508 086

## REVIEW AND APPROVAL STATEMENT

AFCCC/UH—96/004, *Satellite Derived Vertical Moisture Sounding Database Users Handbook*, March 1996, is approved for public release. There is no objection to unlimited distribution of this document to the public at large, or by the Defense Technical Information Center (DTIC) to the National Technical Information Service (NTIS).



MICHEAL S. HUNSUCKER, Maj, USAF  
Chief, Global Climatology Division



JAMES S. PERKINS  
AWS Scientific and Technical  
Information Program Manager  
18 March 1996

## REPORT DOCUMENTATION PAGE

1. Report Date: March 1996
2. Report Type: Users Handbook
3. Title: Satellite Derived Vertical Moisture Sounding Database Users Handbook
4. Authors: Mr. Thomas Elio and Mr. Patrick Giese
5. Performing Organization Name and Address: Operating Location A, Air Force Combat Climatological Center (OL-A, AFCCC), Federal Building, Room 120, 151 Patton Avenue, Asheville, NC 28801-2723
6. Performing Organization Report Number: AFCCC/UH—96/004
7. Distribution/Availability Statement: Approved for public release; distribution unlimited.
8. Abstract: Provides users of upper-air moisture data with a description of the sensor derived moisture obtained from Special Sensor Microwave/Temperature (SSM/T-1 and SSM/T-2), Special Sensor Microwave, Imagery (SSMI), and Vertical Temperature Profile (VTPR) sensors on DMSP and NOAA satellites.
9. Subject Terms: DATABASE, SSM/T-2, PRESSURE, RELATIVE HUMIDITY, SATELLITE SOUNDINGS
10. Number of Pages: 14
11. Security Classification of Report: Unclassified
12. Security Classification of this Page: Unclassified
13. Security Classification of Abstract: Unclassified
14. Limitation of Abstract: UL

Standard Form 298

## PREFACE

AFCCC/UH—96/004, *Satellite Derived Vertical Moisture Sounding Database User's Handbook*, provides users of upper-air moisture data with a description of the format OL-A, AFCCC uses to store data obtained from Special Sensor Microwave/Temperature (SSM/T-1 and SSM/T-2), Special Sensor Microwave Imagery (SSMI), and Vertical Temperature Profile (VTPR) sensors on DMSP and NOAA satellites. In addition, this handbook describes the quality control conducted on data.

## CONTENTS

<b>CHAPTER 1</b>	<b>INTRODUCTION .....</b>	<b>1</b>
1.1	Purpose .....	1
1.2	Background .....	1
1.3	Data Ordering Procedures .....	1
1.4	Questions and Comments .....	1
<b>CHAPTER 2</b>	<b>DATABASE DESCRIPTION .....</b>	<b>3</b>
2.1	Database Construction .....	3
2.2	Database Format Introduction .....	3
2.3	Database Formats .....	3
<b>CHAPTER 3</b>	<b>OL-A, AFCCC PROCESSING AND QUALITY CONTROL .....</b>	<b>5</b>
3.1	Processing .....	5
3.2	Quality Control .....	5
3.3	Database Period of Record .....	5
<b>CHAPTER 4</b>	<b>DATA FORMATS .....</b>	<b>7</b>
4.1	General Information .....	7
4.2	ID Section .....	7
4.3	Data Section .....	8

## Chapter 1

### INTRODUCTION

**1.1 Purpose.** The purpose of the Satellite Derived Vertical Moisture Sounding Database Users Handbook is to provide the user with a general description of the database, to provide specific information concerning the format used to store the data, and to give a brief description of the processing and quality control used in building the database.

**1.2 Background.** The Satellite Sounding (SS) Database includes pressure and moisture data derived from the Special Sensor Microwave/Temperature (SSM/T-1 and SSM/T-2), Special Sensor Microwave/Imagery (SSM/I), and Vertical Temperature Profile (VTPR) sensors on-board Defense Meteorological Satellite Program (DMSP) and National Oceanic and Atmospheric Administration (NOAA) satellites. Operating Location A, Air Force Combat Climatology Center (OL-A, AFCCC) Asheville, N.C., has the responsibility for building and maintaining a database that contains SSM/T-2 data (pressure and moisture only) in support of the Atmospheric Slant Path Analysis Model (ASPAM) at AFCCC, Scott AFB, Ill. The SS database can be used for other applications at AFCCC as well as by other Department of Defense (DoD) and civilian customers.

The SS database contains moisture data (relative humidity) at different pressure levels. Approximately

300,000 worldwide observations are made daily. Approximately 30 megabytes of SS data are transmitted per day per satellite to OL-A, AFCCC from Air Force Global Weather Central (AFGWC), Offutt AFB, Neb., via the Global-ETAC-OL-A Network (GEON). The data undergoes quality control and final climatic database build at OL-A. OL-A transmits SS data to AFCCC via GEON in support of ASPAM processing.

**1.3 Data Ordering Procedures.** DoD customers can obtain SS data by submitting requests in accordance with AFI 15-118 or Department of the Army Pamphlet 115-1. Non-DoD customers should submit requests to the National Climatic Data Center (NCDC), Federal Building, 151 Patton Ave, Asheville, NC 28801-5001. Data is normally provided to customers in the database format specified by this handbook; that is, on 6,250 BPI magnetic tape in 8-bit character format or on 37,871 BPI cartridge tape.

**1.4 Questions and Comments.** Send questions or comments concerning the *Satellite Derived Vertical Moisture Sounding Database* to OL-A, AFCCC, Federal Building, 151 Patton Ave, Room 120, Asheville, NC 28801-5002 (DSN: 266-3100, commercial: (704) 271-4216).

## Chapter 2

### DATABASE DESCRIPTION

**2.1 Database Construction.** OL-A, AFCCC maintains the database on magnetic tape media cartridge tapes in monthly files. Each data record is fixed length, 84 ASCII characters. Data records are blocked 8,148 characters. The data records are sequenced by YEAR-MONTH-DAY-HOUR-MINUTE-LATITUDE-LONGITUDE-SATELLITE SOURCE ID-SATELLITE SENSOR ID.

**2.2 Database Format Introduction.** Data for each observation consists of date, time and source information followed by data for each mandatory level. Currently, only six levels (300, 400, 500, 700, 850, and 1,000 mb) are reported. The database may be expanded to hold additional levels in the future.

The following general comments apply to the SSM/T-2 vertical moisture sounding format:

- Each field is in 8-bit ASCII character format.
- Reserved fields are coded as ASCII character "9s."
- Analysts must avoid trying to obtain more accuracy from the data than was originally observed.

**2.3 Database Formats.** The actual format is listed in Chapter 4. Section 4.2 describes the ID (date, time, and source) information and section 4.3 describes the mandatory level data format information.

## Chapter 3

### OL-A, AFCCC DATA PROCESSING AND QUALITY CONTROL

**3.1 Processing.** Processing of satellite sounding data at OL-A, AFCCC consists of the following:

- Ensuring the format of the data is good and performing an inventory of the incoming data over GEON from AFGWC.
- Performing quality control for any missing levels and erroneous fields. For example: records containing errant ID elements (characters 1-28) and data fields out of range (characters 29-84).
- Shipping data twice daily over GEON from OL-A, Asheville, N.C., to AFCCC, Scott AFB, Ill.
- Archiving data by pulling down from disk to five or six cartridge tapes at the end of the month.

**3.2 Quality Control.** Records with errant ID elements (characters 1-28 out of range) are rejected and are written to an error file for subsequent interrogation by an analyst. Data fields (characters 29-84) out of range are set to missing in the database and the records containing these fields are retained in the database and are written to the error file for further quality control analysis.

**3.3 Database Period of Record.** The SSM/T2 database archival started in April 1995. However, due to satellite problems, the database build was stopped Nov. 11, 1995, at 0600Z. Database build will continue once AFGWC resumes shipment of the SSM/T2 database. The overall quality of the database is good, but there are occasional hours with missing or low data counts.



# SATELLITE DERIVED VERTICAL MOISTURE SOUNDING DATABASE

## Chapter 4

### DATA FORMATS

**4.1 GENERAL INFORMATION.** All information about each sounding is contained in a single 84 character record. Each sounding contains an ID section and a data section.

#### 4.2 ID SECTION.

FIELD NO.	1	2	3	4	5	6	7	8	9
DATA FIELD	YEAR OBS	MON OBS	DAY OBS	HR OBS	MIN OBS	LAT. OBS	LONG. OBS	SAT SOURCE ID	SAT SENSOR ID
# CHARS	XXXX	XX	XX	XX	XX	XXXXXX	XXXXXX	XXXX	X
CHAR LOC	1-4	5-6	7-8	9-10	11-12	13-17	18-23	24-27	28-28

FIELD NO	CHAR LOC	VALUE RANGE	DESCRIPTION OF FIELD AND COMMENTS
1	1-4	0000-9999	<b>YEAR_OBSERVATION.</b> Year of observation.
2	5-6	01-12	<b>MONTH_OBSERVATION.</b> Month of the year.
3	7-8	01-31	<b>DAY_OBSERVATION.</b> Day of month
4	9-10	00-23	<b>HOURLY_OBSERVATION.</b> Hour of day.
5	11-12	00-59	<b>MINUTE_OBSERVATION.</b> Minute of hour.
6	13-17	-9000 to -0001 +0000 to +9000	<b>LATITUDE.</b> Latitude to hundredths of degrees scaled by 100. South latitudes are negative.
7	18-23	-17999 to -00001 +00000 to +18000	<b>LONGITUDE.</b> Longitude to hundredths of degrees scaled by 100. East longitudes are negative.
8	24-27	NO00-NO99 GW00-GW99	<b>SATELLITE_SOURCE_ID:</b> Identifier for source satellite of vertical moisture soundings as follows:  NO00-NO99 = NOAA satellite GW00-GW99 = DMSP satellite
9	28-28	1,2,3,4	<b>SATELLITE_SENSOR_ID</b> Indicates satellite sensor as follows:  1 = SSM/T-1 (DMSP) 2 = SSM/T-2 (DMSP) 3 = SSM/I (DMSP) 4 = VTPR (NOAA)

## CHAPTER 4

### 4.3 DATA SECTION.

FIELD NO.	10	11	12	13	14	15	16-25	26
DATA FIELD	QUAL FLAG SOUND	ATMOS TYPE SOUND	SFC TYPE	NUM LEVELS SAT	PRESS LEVEL X	REL HUM LEVEL X	**	RES
# CHARS	X	XX	X	XX	XXXXXX	XXX	XXXXXX, XXX	XX
CHAR LOC	29-29	30-31	32-32	33-34	35-39	40-42	43-82	83-84

**\*\* Fields 14 and 15 are repeated for each level  
(Field 16-25, char loc 43-82).**

<u>FIELD NO</u>	<u>CHAR LOC</u>	<u>VALUE RANGE</u>	<u>DESCRIPTION OF FIELD AND COMMENTS</u>
10	29-29	1, 2	<b>QUALITY_FLAG_SOUNDING.</b> Indicates the overall quality of the sounding, as follows:  1 = No cloud contamination in sounding 2 = Cloud contamination or suspect data within sounding
11	30-31	01 to 25, 99	<b>ATMOSPHERIC_TYPE.</b> Indicates the atmosphere type used in the derivation of the satellite sounding: 01 - 05 = Ocean 06 - 08 = Land at 0 meters 09 - 11 = Land at 1500 meters 12 - 14 = Land at 3000 meters 15 - 17 = Land at 4500 meters 18 - 20 = Land at 6200 meters 21 - 22 = Sea-Ice 23 - 25 = Coast 99 = Missing
12	32-32	1 - 4, 9	<b>SURFACE_TYPE.</b> Identifies the surface type at the sounding location, as follows:  1 = Ocean 2 = Land 3 = Sea-Ice 4 = Coast 9 = Missing
13	33-34	01 to 99	<b>NUMBER_OF_LEVELS_SAT.</b> Identifies the number of levels within the sounding.

## DATA FORMATS

14 35-39 00100 to 11000

### **PRESSURE\_LEVEL-1.**

Pressure level in tenths of Millibars  
scaled by 10.

15 40-42 000 to 100,  
999

### **RELATIVE\_HUMIDITY\_LEVEL\_1.**

Relative humidity in percent for level  
identified above. 999 indicates missing.

16-25 43-82 Same as 14 and  
15

### **PRESSURE\_LEVEL\_X AND RELATIVE\_HUMIDITY\_X.**

Same as fields 14 and 15 respectively, but repeated for levels 2-6.

26 83-84 99

### **RESERVED.**